Radiation Therapy – External Beam

Approximately 50% of all cancer patients will receive some type of radiation treatment. Radiation therapy is external radiation treatment in which doctors use focused beams of radiation to treat cancerous tumors. It is just one of the many different methods of radiation treatment administered in hospitals. There are different types of radiation therapy: external beam therapy, three-dimensional conformal radiation therapy, and stereotactic radiosurgery.

- *External Beam Therapy* delivers a single beam of high-energy x-rays to the location of the patient's tumor. The beam is generated outside the patient, by a machine called a linear accelerator, and is targeted at the tumor site. These treatments are usually performed in multiple sessions over the course of several weeks.

- *Intensity-Modulated Radiation Therapy* uses a computer simulation to produce an accurate image of the tumor and surrounding organs so that multiple radiation beams can be shaped exactly to the contour of the treatment area. Because the radiation beams are precisely focused, nearby healthy tissue is spared.

- *Stereotactic Radiosurgery* is not, as the name suggests, a form of surgery. It is usually a one-day treatment of a single high-dose—or sometimes smaller, multiple doses—of radiation beams that converge on the specific area of the brain where the tumor or other abnormality resides. Using a helmet-like device that keeps the head completely still and three-dimensional computer-aided planning software, stereotactic radiosurgery minimizes the amount of radiation to healthy brain tissue.

These methods are painless, treat various types of cancer, and often work in conjunction with other forms of treatment (e.g., chemotherapy or surgery). The linear accelerators used in these treatments emit high-energy x-rays,a form of electromagnetic ionizing radiation. Ionizing radiation is high-energy radiation capable of stripping electrons from atoms. The free electrons have the ability to damage living cells, such as in tumors. This is how radiation therapy stops cancer cells from dividing and growing, thus slowing tumor growth. In many cases, radiation therapy is capable of killing cancer cells, thus shrinking or eliminating tumors.

The machine sits in a room with lead and concrete walls so that the high-energy x-rays do not escape. The radiation therapist must turn on the accelerator from outside the treatment room. One of the benefits of accelerators is that, unlike radioactive sources, they only produce radiation when they are operated.

Who is protecting you

The States

State radiation programs, in cooperation with the Food and Drug Administration, regulate, register, and inspect x-ray equipment used in medical, dental, and veterinary work.

U.S. Food and Drug Administration (FDA)

While the states regulate use of x-ray equipment, FDA's Center for Devices and Radiological Health regulates the manufacturing of radiation-emitting electronic products.

National Institute of Standards and Technology (NIST)

The mission of NIST is to develop and promote measurement, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life. Although a non-regulatory federal agency, NIST makes x-ray machines safer for patients and workers by updating the technology and measurement standards upon which x-ray machines are based.

What you can do to protect yourself

Only trained and qualified persons should operate the accelerator. You should follow any instructions given by your doctor, nurse, or the radiation therapist. You should tell your doctor if you are pregnant, might be pregnant or are nursing. Finally, if you have any concerns or questions before undergoing medical testing or treatment involving radiation, don't hesitate to ask your doctor or the radiation therapist.

Resources

You can explore this radiation source further through the resources at the following URL: http://www.epa.gov/radtown/radiation-therapy.html#resources

We provide these resources on-line rather than here so we can keep the links up-to-date.